

Amendment and Response

Serial No.: 10/676,324

Confirmation No.: 6481

Filed: 30 September 2003

For: PRODUCTION OF HYDROGEN FROM ALCOHOLS

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Remarks

The Office Action mailed July 22, 2005 has been received and reviewed. Claims 18, 28, and 35 having been amended and claims 25, 34, and 41 having been cancelled, the pending claims are claims 1-24, 26-33, 35-40, and 42-50.

The specification has been amended to correct a typographical error in the Department of Energy grant number provided under the heading, "Statement of Government Rights."

Claims 18, 28, and 35 have been amended to incorporate matter recited in cancelled claims 25, 34, and 41.

No new matter has been added as a result of the above amendments.

Reconsideration and withdrawal of the rejections in view of the above amendments and the following comments are respectfully requested.

The 35 U.S.C. §102 Rejection

The Examiner rejected claims 1-7, 9-15, 18-25, and 35-50 under 35 U.S.C. §102(e) as being anticipated by Anzai et al. (U.S. Patent Application Publication No. 2003/0060364 A1). Applicants submit that as claims 25 and 41 have been cancelled, the rejection with respect to these claims is rendered moot. With respect to pending claims 1-7, 9-15, 18-24, 35-40, and 42-50, Applicants respectfully traverse this rejection.

For a claim to be anticipated under 35 U.S.C. § 102(b), each and every element of the claim must be found in a single prior art reference (M.P.E.P. §2131). Applicants respectfully assert that Anzai et al. fail to teach each and every element of the rejected claims.

Applicants' independent claims 1 and 42 recite a process for the production of hydrogen including a stratified catalyst. As taught in Applicants' specification, a stratified catalyst is a catalyst that includes layers or strata of catalytic material (specification, page 9, lines 23-24) and is shown, for example, in Figure 1. The stratified catalyst according to Applicants' invention is not merely defined as a catalyst having inlet and outlet zones, as suggested by the Examiner in the present Office Action at page 2, item 2, paragraph 2.

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Anzai et al., on the other hand, do not teach or suggest a stratified catalyst according to Applicants' invention. While the catalysts of Anzai et al. may include, in addition to rhodium, other noble metals such as ruthenium, platinum, iridium, and palladium (Anzai et al., paragraphs [0038] and [0044]), there is no teaching that any additional metals are provided as layers or strata. Furthermore, Applicants point out that none of the examples teach Applicants' stratified catalyst. In each of Examples 1-8, as well as Comparative Examples 1 and 2, the catalyst is prepared by first preparing the support, dipping the prepared support in a rhodium chloride solution, evaporating off the water, then drying, pressing, grinding, and sifting the rhodium loaded support to provide a granulated catalyst. No layers or strata of catalytic materials are taught.

Thus, for at least the reason that there is no teaching whatsoever in Anzai et al. of a stratified catalyst, Applicants respectfully submit that claim 1, along with claims 2-7 and 9-15, directly or ultimately dependent thereto, as well as claim 42 and claims 43-50 directly or ultimately dependent thereto are not anticipated by Anzai et al.

Applicants further point out that independent claims 18 and 35, as amended herein, recite a process for the production of hydrogen wherein the feed gas is at a temperature of no greater than about 160°C prior to contact with the catalyst. Applicants respectfully submit that Anzai et al. fail to teach this element of the rejected claims. Thus, Applicants assert that claims 18 and 35, as well as claims 19-24 and 36-40 dependent thereto, are not anticipated by Anzai et al.

In view of the above comments, Applicants assert that claims 1-7, 9-15, 18-24, 35-40, and 42-50 are not anticipated by Anzai et al. Reconsideration and withdrawal of the rejection are, thus, respectfully requested.

The 35 U.S.C. §103 Rejection

The Examiner rejected claims 8, 16, 17, and 26-34 under 35 U.S.C. §103(a) as being unpatentable over Anzai et al. (U.S. Patent Application Publication No. 2003/0060364 A1).

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Applicants submit that as claim 34 has been cancelled, the rejection with respect to this claims is rendered moot. With respect to pending claims 8, 16, 17, and 26-33, Applicants respectfully traverse this rejection.

To establish a *prima facie* case of obviousness, three basic criteria must be met.

First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references must teach or suggest all the claim limitations. *See* M.P.E.P. § 2143.

In view of the above comments, Applicants respectfully assert that Anzai et al. fail to teach Applicants invention as recited in claims 1 and 18. For at least this reason Anzai et al. also fail to teach or suggest Applicants' invention as recited in claims 8, 16, and 17, dependent upon claim 1, and fail to teach or suggest Applicants' invention as recited in claims 26 and 27, dependent upon claim 18.

Furthermore, Applicants assert that Anzai et al., for at least the reason that they fail to teach or suggest a process for the production of hydrogen wherein the feed gas is supplied at a temperature of no greater than about 160° prior to contact with the catalyst, also fail to teach Applicants' invention as recited in claim 28, as amended herein, as well as claims 29-33 dependent thereto.

Anzai et al. teach a reforming reaction wherein the feedstock is preheated, mixed with steam and air or oxygen, and introduced into the reactor including the catalyst (Anzai et al., paragraph [0048]). The reaction temperature is 200 to 800°C, and preferably 300 to 600°C at the inlet for the catalyst bed (Anzai et al., paragraph [0049]). No pre-heating of the catalyst or reactor is taught in either the description of the invention or the examples. Applicants assert, therefore, that the only inlet temperature disclosed is the range of 200 to 800°C, and preferably 300 to 600°C.

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Anzai et al. recite:

In the case of using a gas as the feed stock in the autothermal reforming reaction, the gas preheated to a predetermined temperature is well-mixed with steam and air or oxygen, and then introduced into a reactor filled with the catalyst. In the case of using a liquid as the feed stock, the liquid is evaporated, well-mixed with steam and air or oxygen, and then introduced into a reactor filled with the catalyst.

Anzai et al., paragraph [0048].

However, Applicants respectfully submit that Anzai et al. fail to explicitly teach or suggest that a feed gas is supplied at a temperature of no greater than about 160°C prior to contact with the catalyst.

Moreover, since Anzai et al. recite that the reaction temperature is generally 200-800°C, and preferably 300-600°C **at the inlet for the catalyst bed** (Anzai et al., paragraph [0049]), Applicants respectfully submit that one of skill in the art would recognize that the feed gas entering the inlet for the catalyst bed (i.e., prior to contact with the catalyst) would be greater than 160°C.

Applicants' process, in contrast, includes certain embodiments, such as are recited in independent claims 18 and 35, wherein the feed gas is supplied at a temperature of no greater than about 160° prior to contact with the catalyst.

For at least the above reasons, Applicants respectfully assert that claims 8, 16, 17, and 26-33 are not obvious over Anzai et al. Reconsideration and withdrawal of the rejection are respectfully requested.

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For: PRODUCTION OF HYDROGEN FROM ALCOHOLS**Summary**

It is respectfully submitted that all the pending claims are in condition for allowance and notification to that effect is respectfully requested.

The Examiner is invited to contact Applicants' Representatives, at the below-listed telephone number, if it is believed that prosecution of this application may be assisted thereby.

Respectfully submitted for

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CERTIFICATE UNDER 37 CFR §1.8:

The undersigned hereby certifies that the Transmittal Letter and the paper(s), as described hereinabove, are being transmitted by facsimile in accordance with 37 CFR §1.6(d) to the Patent and Trademark Office, addressed to Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 24th day of October, 2005, at 4:25pm (Central Time).

By: Name: Sue Dombroske